DRINK TAP WATER OR NOT? : A BEHAVIORAL ECONOMICS APPROACH TO IMPROVING CITIZENS' PERCEPTIONS AND DRINKING OF TAP WATER

By

JEONG, Gon Sung

CAPSTONE PROJECT

Submitted to

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Professor Taejun LEE, Supervisor

Professor TaeJong KIM

Professor Seulki CHOI

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ABSTRACT

Drink Tap Water or Not? : A Behavioral Economics Approach to Improving Citizens' Perceptions and Drinking of Tap Water

By

Jeong Gon Sung

As of 2013, the average direct drinking rate of tap water in Korea is 5.4%, and the direct and indirect drinking rate is 55.2%. This is lower than the OECD countries such as the US and Japan, which have a direct drinking rate of 55.2% and direct and indirect drinking rates of 70 ~ 80%.

In spite of efforts to replace old water pipes with new ones and introduce high-level water treatment, ‘unprovoked distrust’ has been a major reason of not drinking tab water. This indirectly shows the low trust in the policies implemented by governments and public organizations to improve tap water quality.

In order to substantially increase the tap water drinking rate, it is necessary to increase a number of the SWC project that consumers can experience directly in the target area. The SWC project increased the trust in water policy, and its trust led to changes in people’s behavior toward drinking tab water.

And also applying ‘nudge’ to people who are satisfied or at least dissatisfied with tap water can be effective in increasing tap water drinking

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Jeong Gon Sung

1. Introduction

1-1. Background of study

As Korea had been experiencing rapid economic growth, planned investment in waterworks had increased, and the rate of the nation's water supply, which was 17% in 1961, rose to 70% by the end of the 1980s. In late of 1980s, the media had reported that tap water was contaminated by microorganisms and heavy metals when the supply of water started to stabilize due to the quantitative growth of waterworks. Until then, it was natural for people to drink tap water, but after the incident of heavy metal pollution, people began to worry about the quality of tap water. (Gyeonggi Research Institute 2015)

In 1991, people's trust in tap water fell to the bottom due to the Nakdong River phenol leaking incident. Since then, The perception that tap water is water that can not be drunk had become widespread. (Ministry of Environment 2010).

The government has made a lot of efforts to improve the water quality of tap water, such as the strengthening of water quality standards and the introduction of advanced water treatment

processes. As a result of efforts to improve the quality of tap water, the Korean tap water has been recognized worldwide for its taste and quality.[1]

In these days, people's satisfaction with tap water is high. 59.2% satisfied with tap water, and 35.3% felt normal. The rate of dissatisfaction with tap water is very low at 5.2% (Tab Water Public Relations Association[2] 2014). However, Compared to the rate of dissatisfaction with tap water, tap water drinking is very low. The satisfaction of tap water does not lead directly to drinking tab water.

As of 2013, the average direct drinking rate of tap water in Korea is 5.4%, and the direct and indirect drinking rate is 55.2%. This is lower than the OECD countries such as the US and Japan, which have a direct drinking rate of 55.2% and direct and indirect drinking rates of 70 ~ 80%. (The Tab Water Public Relations Association 2014)

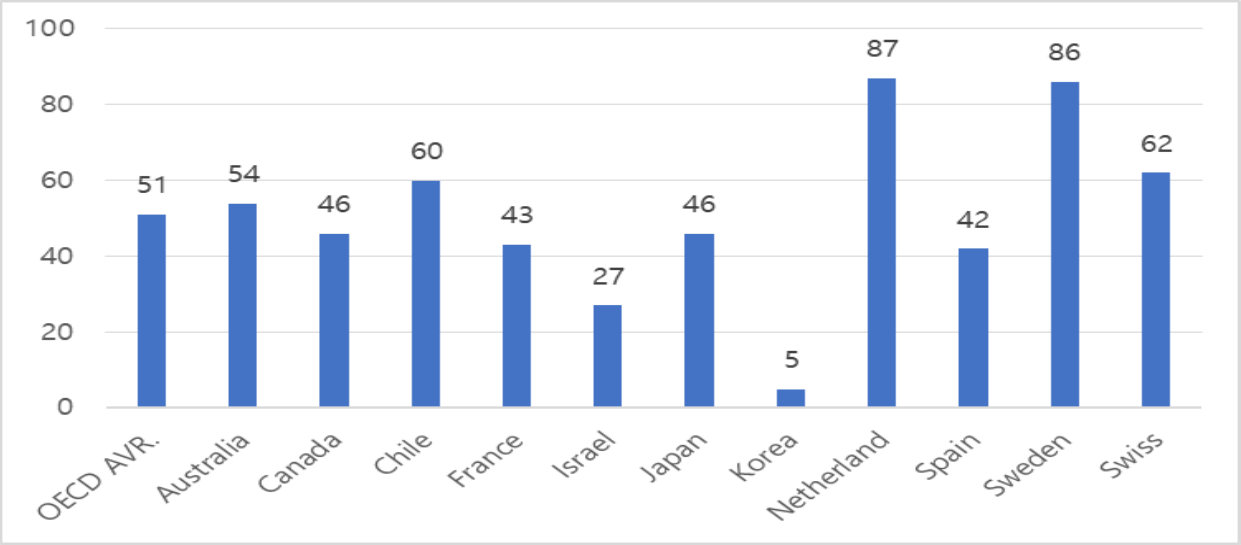
[1] Ranked 8th on the national water quality index (Un Water, 2008), Ranked 7th in 22nd annual The Berkeley Spring International Water Tasting (2012)

[2] The Tab Water Public Relations Association participates in 10 organizations including the Ministry of Environment, K-water and metropolitan municipalities to improve the perception of tap water.

The Tab Water Public Relations Association has changed the survey of annual satisfaction with tap water from 3 years to 2013. The most recent survey, the tap water satisfaction survey in 2017, does not distinguish between direct drinking and indirect drinking. The Tab Water Public Relations Association officially announced that 49.5 percent of the nation drink tap water based on the 2017 survey results. In the survey which was conducted by Gyeonggi Research Institute in 2015, the direct drinking rate was 1.3%, and the tap drinking rate including the indirect drinking rate was 26.3%. When the drinking rate is defined as the drinking water that is mainly consumed in everyday life, it can be said that the survey by Gyeonggi Research Institute shows the actual drinking rate more accurately.

However, this report is based on data from the Council on Drinking Water Promotion, which is the only regular survey of the nationwide unit drinking rate, based on the 2013 data, which was more accurate. (From the 2017 survey, the questionnaire items have shrunk dramatically, and the accuracy of the survey has been somewhat lowered)

Figure 1 Tab Water Dringkung Rate of The OECD Country



Source : OECD (2013) Greening Household Behaviour : 2011 Survey

1-2. The problem

Tap water is an important public goods, and a lot of money is annually being invested in the production and supply of tap water. However, if people do not drink tab water, it can cause a huge social waste. In particular, additional social costs related to the use of the bottled water and water purifiers due to distrust of tap water are estimated to be about 2 trillion KRW per year (Ministry of Environment 2010).

Compared to using tap water for drinking water, individual households pay about 600 times more for water purifiers and 367 times more for the bottled water. And not for drinking high quality tap water, but for other uses is another overinvestment and waste of the money from people's tax. In addition, the bottled water generates a lot of CO2, even in the case of water purifiers, it also generates CO2 due to the use of electric power. So they are not environmentally friendly

1-3. The purpose of study

The purpose of this study is as follows.

First, this study analyze the reason why people do not drink tab water and discuss ways to improve the drinking rate of tap water.

Second, this paper applies the theory of behavioral economics to the way to change the behavior of people who are already satisfied with tap water and do not drink tap water.

2. Literature Review

The tap water drinking rate survey has been conducted annually by the Tab Water Public Relations Association since 2009. After 2013, the annual tap water satisfaction survey was temporarily suspended and the survey was resumed in 2017. The survey cycle has changed to 3 years since 2017.

Research on tap water drinking rate has been conducted mainly in the public sector such as the government and metropolitan cities. The Ministry of Environment (2013) and Gyeonggi Province (2015) insisted on improvement of supply process, water treatment and efficient tap water promotion to improve drinking rate. Key public relations methods include constructing a public relations council for local residents to directly participate, expanding the installation of negative water in public places, and promoting the excellence of tap water through media. However, these public relations-oriented public relations were unilateral and criticized for symbolic communication for improving organizational reputation and image, rather than behavioral change of the public.

Cho and Shim (2007) criticized the problems of a simple one-off publicity campaign aimed at media coverage of tap water and pointed out that the approach to promote relations is more effective in promoting trust in tap water. Lee (2009) argued that more active communication is needed with the public in tap water drinking campaigns. The public who actively communicates that there is a high likelihood of becoming a positive active public on the issue.

On the other hand, recent efforts to apply behavioral economics to various fields such as education, health, social welfare, public policy and consumer policy have been made, but study on the behavioral economics related to tap water has not been conducted yet.

3. Analysis on the problems of past activities and the causes of not drinking tap water

3-1. The problems of past activities

The government and the local governments have continuously introduced advanced water treatment to improve the water quality of the tap water, and have invested a huge amount of money in order to improve the old water pipeline. And also in order to improve the perception of tap water, various activities such as publicity through the media, social media, and many other ways have been carried out by the government and public institutions. However, as can be seen from the fact that satisfaction with tap water does not lead to tap water drinking behavior, the effectiveness of the perception improvement activities is insignificant.

The government and public organizations such as The Tab Water Public Relations Association have made assertions that tap water is safe. In addition, they were continuing their one-sided effort such as organizing one-time tap water drinking event and distributing tap water in bottles. (Kim 2006)

For example, in the case of the publicity activities of The Tab Water Public Relations Association, they select agencies for the annual publicity campaign, and one-off events and media reports are being promoted. Publicity mainly focuses on injecting images that tap water is safe and environmentally friendly, but publicity messages are also not consistent from year to year.

3-2. The reason why people do not drink tap water

From the tap water satisfaction survey in 2013, the item ‘unprovoked distrust’ was deleted from the survey. Before 2013, the ‘unprovoked distrust’ category is the highest cause of drinking, followed by old water pipes, smell and water quality concerns.

Table 1 The reason why people do not drink tap water from the tap water satisfaction survey

Item	2009	2010	2011	2012	2013
unprovoked distrust	35.3%	31.0%	30.2%	31.9	-
Problems with water tanks or old water pipes	16.5%	17.6%	17.7%	18.3	30.8
Smell and taste	15.5%	16.7%	18.1	15.0	28.1
Pollution problem of water source	9.3%	13.3%	14.3	14.6	24.0
Things like rust	9.8%	13.5%	11.6	10.2	-

From 2009, when The Tab Water Public Relations Association launched a survey on the tap water satisfaction survey, ‘unprovoked distrust’ had been the top reason for not drinking tap water. In spite of efforts to replace old water pipes with new ones and introduce high-level water treatment, those problems have been major reasons of not drinking tab water. This indirectly shows the low trust in the policies implemented by the government and public organizations to improve tap water quality.

For example, according to a survey by the Civil Society Research Institute in 2014, only 24.2% of the respondents agreed to the government's announcement that there was no abnormality in the quality of tap water through the treatment of high-altitude water treatment at the time of green algae (K-water 2017).

Among the factors influencing tap water drinking, gender and reliability on tap water management policy were relatively influential. In particular, those who replied that they trust the tap water management policy were estimated to have 2.7 times higher chance of drinking tap water than those who did not (Kim 2014). In other studies, restoration of trust in tap water policy and provision of objective information were suggested as an important factor in increasing user satisfaction and lowering the likelihood of drinking water.

Therefore, in order to increase the drinking rate of tap water, it is important to accurately communicate the safety of tap water and to raise social trust in tap water policy.

In addition, the tap water drinking rate is too low compared to the unsatisfactory ratio of the tap water. Changing people's behavior requires a new approach. Behavioral economics, which has been attracting attention in recent years, can be an alternative.

4. Policy Recommendation

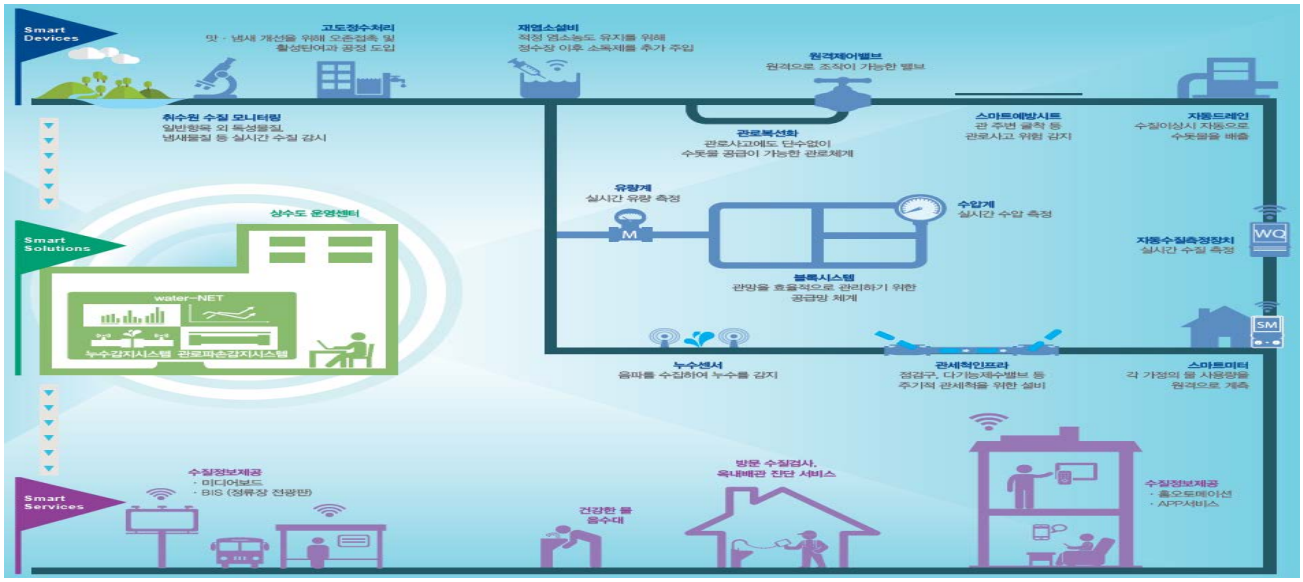
4-1. Proving experience-based policy services focusing on regional units

In Paju City in 2014, K-water, Korea's only water management public organization, launched an exciting project called Smart Water City. K-water defines the SWC project as a city of water that provides healthy tap water that consumers trust. The SWC project is a new water service business model that transforms tap water production and supply business from supplier-oriented to consumer-oriented.

The SWC project is largely divided into improvement of supply system and strengthening of customer service. The project has dramatically improved the water supply system.

First, in order to increase the safety of tap water supply, an emergency line connecting the multiple areas water supply and the local water supply line was installed to prevent an accident in which the tap water supply was stopped.

Figure 2 SWC project the schematic picture



Secondly, a disinfectant dispensing system was introduced for the taste, smell and water quality of tap water. In addition, it has enhanced the safety of tap water by constructing an automatic drain system that automatically emits pollutants to the outside when water polluted. Water pipe cleaning has also improved.

Finally, the SWC has dramatically improved customer services to enhance customer satisfaction. ‘Water-Coordinators’ have visited each family to manage the water quality of the tap water, and ‘Water Doctors’ have provided a total care service to check and wash the water pipes in the house.

Figure 2 Water-Coordinators and Water Doctors

		
Water-Coordinators	Water Doctors	

Consumers can also check the quality of their tap water at all times through smartphone apps and electronic boards in their apartment.

Figure 2 Electronic board and Smartphone app

		
Electronic board	Smartphone app	

The SWC project also includes a reimbursement insurance service that compensates up to KRW 1 billion per case when people drink tap water and get some problems of their health.

The safe insurance service system is an impressive device that matches the characteristics of Korean consumers. Korean consumers need to emphasize such policies because they are more likely to avoid risk aversion, guaranteeing quality assurance, AS, loss insurance, etc. (Lee and Kim 2014)

The SWC project is designed to enable citizens to directly experience the safety and excellence of tap water in their homes. Citizens who directly experienced the safety and excellence of tap water naturally improved their perception of tap water positively.

The results of the project were amazing. The direct drinking rate of tap water, which was 1% before the project, soared by an average of 36.3% in three years. Households using water purifiers also decreased by 12% point from 46% to 58% before the project, and households using water springs also decreased by 15% point from 32% to 17%. (Kim 2015)

Figure 2 The direct drinking rate in SWC project areas

The reason why the SWC project was able to achieve great results was because it provided objective information to consumers and communicated them interactively. That raised the credibility of the policy.

The SWC project was not a one-sided policy as it was. The project is a policy of direct communication with citizens, which leads to improved perception of tap water and to change people's behavior toward drinking tab water. In fact, the satisfaction rate of the SWC project reached 93.8% in 2016.

One - way policy targeting the whole nation is hard to satisfy consumers. People see and hear only what they are interested in. TV ads or campaigns that advertise tap water's safety for an unspecified number of people only is like wasting money and it has no effect on people's behavior change. Many people who are not interested in tap water may not even know there is a TV commercial and campaign related to tap water.

In order to substantially increase the tap water drinking rate, it is necessary to increase the number of the SWC project that consumers can experience directly in the target area. The SWC project increased the trust in water policy, and its trust led to changes in people's behavior toward drinking tab water. In this respect, what the SWC project suggests to the tap water drinking rate is very important.

4-2. Nudging

Recently, behavioral economics has been used in policy making in many areas. From health problems such as individual weight management and smoking, to global climate change issues, the use of behavioral economics is extensive. In behavioral economics, there is the term 'nudge'.

‘Nudge’ is also the title of a book by Richard Thaler who won the Nobel Prize for economics in 2017.

A nudge is any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. (Thaler and Sunstein 2008). In other words, the meaning of ‘nudge’ is to lead to change people’s behavior in a small design. Applying nudge to people who are satisfied or at least dissatisfied with tap water can be effective in increasing tap water drinking.

4-2-1. Social Incentive

Human are deeply social animals. Our beliefs, desires and behaviors are affected by social preferences, our relationship, and the social contexts in which we live and make decisions. Human sociality – the tendency among humans to associate and behave as members of groups – affects decision making and behavior and has important consequences for development (World development report 2015).

Our social tendencies mean that we are not purely selfish and wealth-maximizing actor, as many economic models and policies assume; rather, we value reciprocity and fairness, we are willing to cooperate in the attainment of shared goals, and we have a tendency to develop and adhere to common understandings and rules of behavior, whether or not they benefit us individually and collectively.

For these reasons, social incentive can exert powerful effect on behavior. In fact, social rewards, such as status and recognition, can motivate people to exert effort and can even substitute for monetary rewards in some situation.

Representative success stories using social incentives can be found in the UK. The HMRC (HM Revenue & Customs) used to send a letter of warning to the people who failed to pay a tax on due date, but it did not work. So, the HMRC implemented a nudge policy in a region that uses social incentives. A nudge implemented by the HMRC was the addition of a sentence to the tax bill. The sentence was this. 'Nine out of ten people in the United Kingdom pay their tax on time. You are currently in the very small minority people who have not paid us yet.'

The effect of the nudge was great. Taxes repayment rate boosted by around 15 percentage points. If rolled out nationally, this would free up collector resource capable of generating £30 million of extra revenue annually and would advance over £160 million of cash flow by around six weeks each year. (Behavioural insights team 2011)

This lesson can be applied equally to the tap water policy. it can be added a sentence to the tap water bill. A sentence will be this. 'Eight out of ten people in Korea satisfy with tab water or no worries about the quality of the tab water, and half of them drink tap water.' People tend to be touched by others' thoughts and behaviors, which can lead to behavioral changes. Highlighting what other people are doing is a really strong incentive.

Social rewards can also be a solution. The proportion of apartments in the form of housing in our country is 48.1% (Statistics Korea 2016). To increase the efficiency, it can be applied to social rewards mainly to the apartment residents.

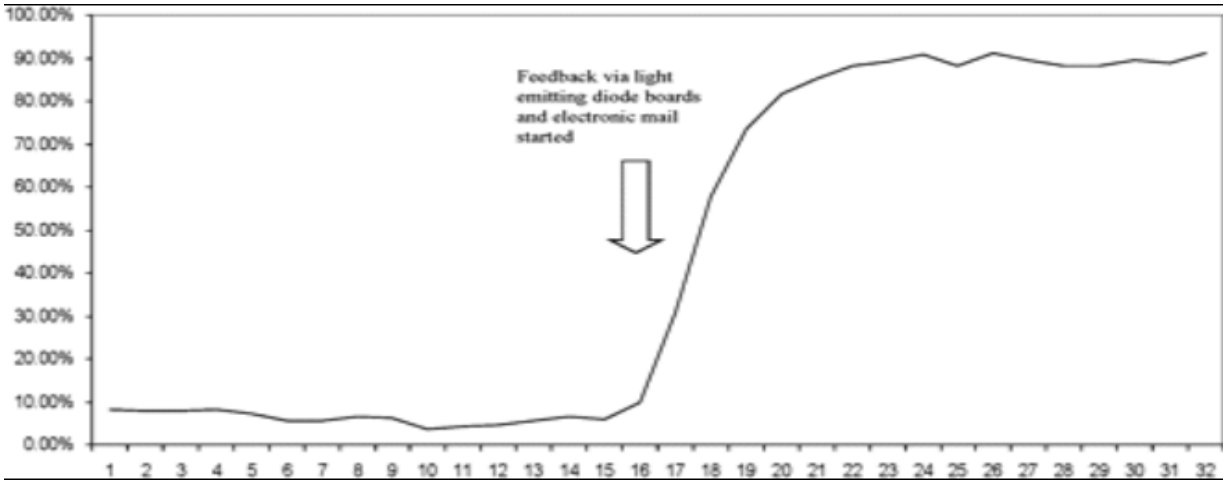
First, make an agreement to drink tap water between apartment residents and the local government. The local government give a certificate to the apartments that have signed the agreement. Set the target drinking rate when concluding an apartment contract for drinking tap water. The target drinking rate is set based on the current drinking rate, and when the annual goal is reached, the certification is renewed in the following year. In the apartment that is certified as a tap water drinking house, a certification card is placed at the front of the apartment. And also install electric signboard to give information of the water quality of the tap water to the resident.

Apartment residents can reduce carbon production by drinking tap water. Suppose that the resident plant trees as much as the amount of the carbon that they reduce by drinking tab water. Apartment residents can get information that how many trees are planted each day and month, by their drinking water. Residents can see every day that drinking tap water contributes to the global environment, beyond our community. This will be a powerful social reward to increase the tab water drinking rate.

A similar experiment was conducted in the United States in 2011. Hand hygiene is an important factor in protecting patients from healthcare-associated infections in the hospital, yet reported compliance with hand hygiene averages about 38.7%. Intensive care units report lower rates of hand hygiene compliance (30%–40%) compared with other healthcare settings (50%–60%) (Armellino et all 2011)

At the hospital, the rate of washing hands was only about 30% before medical staff contacted the patient. Even after the camera was installed to monitor the washing of the hands, there was no change in the behavior of the medical staff. But then an intervention was introduced. An electronic board that told the medical staff how well they were doing. Every time they washed their hands, the numbers went up on the screen. It showed them their rate of current shift and the rate of the weekly staff.

Figure 2 Hand hygiene compliance rate



The result was amazing. hand hygiene compliance raised to 90%. Medical staff could see the number go up, it made them feel good. With this immediate social reward, the persistence of behavior could be maintained for a long time.

4-2-2. Loss Aversion

People feel the losses more acutely than they would feel the gains of a similar size. We call it ‘loss aversion’. Loss aversion can be used to influence the behavior of others. In Chicago, for instance, teachers were paid a bonus at the beginning of the school year, in advance, but were told they would lose it if students did not meet a threshold level of achievement by the end of the

school year (Fryer and others 2012). These teachers expended a substantially greater effort than did teachers who were in all other respects similar but who could receive the bonus only at the end of the year. The potential loss of the bonus was more salient than the potential gain of the bonus.

Let's use the loss avoidance to nudge people who have promised to drink tab water. For apartments that promised to drink tap water, the local government can cut off part of the one-year water bill in advance based on whether or not the target drinking rate is achieved. The ratio of the reduction amount shall be set at the time of making the agreement. Then water rate reduction can be a bonus just like the case of teachers in Chicago. If the drinking rate survey is below the target at the end of the agreement, the water rate that was previously deducted will be charged again. People think this is a loss.

As mentioned earlier, people are more sensitive to the loss than the gain. The loss aversion effect will be an incentive to maintain tap water drinking rates.

5. Conclusion

Despite the excellent quality, many people are not drinking tap water. This is because the perception of tap water is not good. Past policies were not well known or could not have a great effect due to low confidence in the policy.

The SWC project, launched in 2014 at K-water, is a policy that can play a major role in raising the trust of tap water. The trust of tap water has been greatly improved because residents can see and experience the effects of the policy directly. The trust in tap water led to changing their behavior to drink the tab water.

It is also a problem that the tap water drinking rate is low compared to the proportion of people who are dissatisfied with tap water. In order to solve this problem, this paper proposed how to increase tap water drinking rate by using social incentives. And this paper also recommended the way to sustain tapping behavior using the concept of loss avoidance.

There are no studies that have applied behavioral economics to tap water drinking rate. It is the limit of this study that it can not be measured whether the policy using the social incentive or the loss aversion concept has actual effect. The policy effect should be proven through other studies or experiments.

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